

**OCULOMETRIC ANALYSIS OF PURSUIT EYE MOVEMENTS
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Are perceptual motion coherence and smooth-pursuit eye movements linked? Physiological and psychophysical evidence suggests that MT and MST integrate local motions to determine global object-motion signals. If these signals are then used for both pursuit and perception, measurement of pursuit should reflect perceptual coherence. For 2 observers (one naive), we simultaneously measured pursuit and perception of a line-figure diamond (vertex angles of 40° & 140°) moving sinusoidally along a linear trajectory ($\pm 2.7^\circ$, 0.94 Hz) behind two vertical apertures ($3.3^\circ \times 18^\circ$) in 1 of 7 directions (0° , $\pm 3^\circ$, $\pm 6^\circ$, $\pm 9^\circ$ from straight down). The diamond's corners were always occluded such that only 4 moving line segments (93 cd/m²) were visible within either dark (0.2 cd/m²) or light (equiluminant with the 38 cd/m² surround) apertures. To reduce the usefulness of configural cues, on each trial zoom ($\pm 14\%$) and a horizontal offset ($\pm 0.7^\circ$) were added to the motion. Observers judged whether the motion appeared leftward or rightward of straight down. For each trial, the saccade-free portions of the steady-state eye-position traces were fit to determine the pursuit direction, which was then used to make a L/R "oculometric" decision. For dark apertures (coherent condition), the psychometric and oculometric curves were steep (mean thresholds 3.1° and 7.6° respectively). For the invisible apertures (incoherent condition), both curves were at least 3X flatter and the judgements were near chance for all angles tested. These results show that oculometric analysis may provide a quantitative metric of perceptual coherence. NASA RTOPs 548-50-12 & 199-16-12-37